UNIT 4

PROBABILITY AND STATISTICS

Date Started:

DATE FINISHED:

I LEARNED:

Unit 4: Probability and Statistics Topics

- ✓ Basic Probability (what is the probability of....)
- ✓ Theoretical vs. Experimental
- ✓ Tree Diagrams
- ✓ Fundamental Counting Principle
- ✓ Compound Events
- ✓ Simulations
- ✓ Biased and Unbiased Samples
- ✓ Measures of Central Tendency
- ✓ MAD
- ✓ Histograms
- ✓ Box and Whisker Plots
- ✓ Comparing Data Sets

Standard: 7.SP.5
Probability Intro

Page # 61
Date:_____

Remember

1) $3x + 15 = 24$

2) $72 \div (2+4)^2 =$

3) $\sqrt{729}$

4) $14 \div (9-2) + 2^0 =$

5) $(-2)(-5) =$

Learn

Experiment:

Outcome:

Favorable Outcomes:

Probability is always between _____ and ____.

Sample Space:

Event:

Practice

A Letter from the word MATHEMATICS is chosen at random.

a) List the possible outcomes:

b) List the favorable outcomes for:

1) choosing an H

2) choosing an M

3) Not choosing an s

4) Choosing a vowel

The spinner below is spun once.

a) List the possible outcomes:

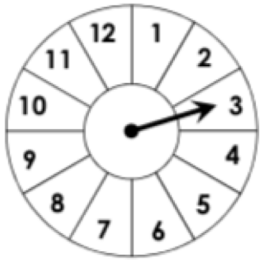
b) List the favorable outcomes of:

1) Spinning a 12

2) Spinning an even number

3) Spinning a number less than 8

4) Spinning a prime number



Standard: 7.SP.5

All About Probability

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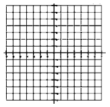
Date: ___

Remember

1)Name each quadrant.



2) $(-5)(2)(-8) =$

3) What is the perimeter of a square that has the same area as a 2 x 8 rectangle?

4) Draw a **regular** octagon.

5) $3x + 15 = 27$

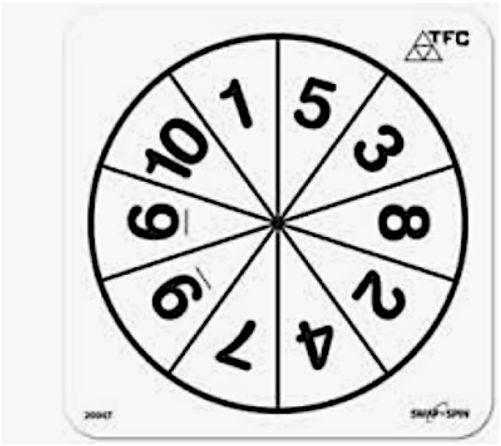
- ✓ Probability is a measure of the _____ that a specific _____ will occur.
- ✓ Probabilities have values between _____ and _____.
- ✓ An event that is impossible has a probability of _____.
- ✓ An event that is certain to occur has a probability of _____.

Learn

P (event) =

Probabilities can be written as fractions, decimals, or percents!!!

Practice



The spinner is spun once. Find each probability as a fraction (in simplest form), decimal, and percent.

a) P (odd)

b) P (multiple of 4)

c) P (prime number)

d) P (even or greater than 5)

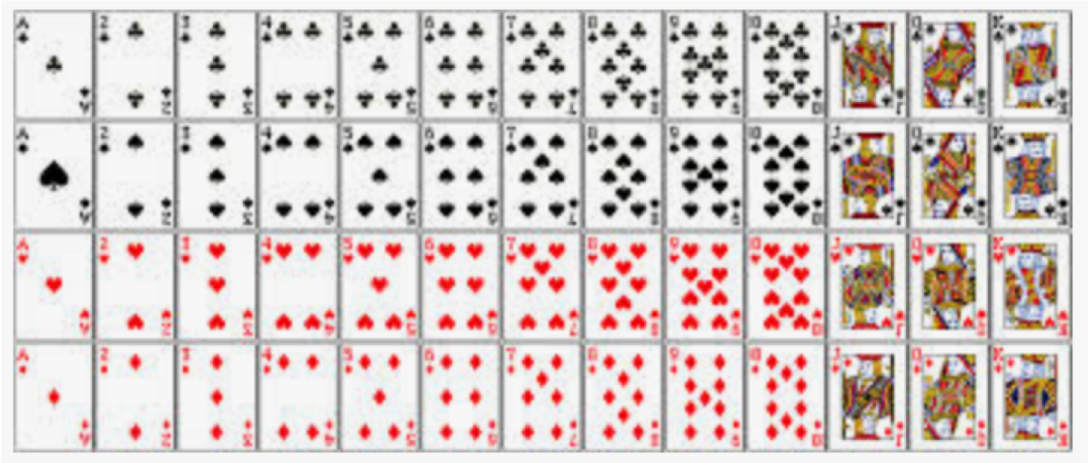
1) Find the probability of rolling an even number on a die.

2) Find the probability of getting Heads on 3 coin flips in a row.

3) Find the probability of rolling both even numbers when you roll two dice..

4) Find the probability of choosing a King from a deck of cards.

Practice



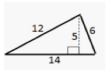
	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

Standard: 7.SP.5
Theoretical vs. Experimental

Page # 66
Date:_____

Remember

1)Find the area.
Units are inches:

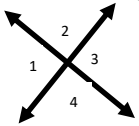


2)Write as a fraction: 0.84

3) Write as a decimal: $2\frac{2}{9}$

4) Solve:
$\frac{y}{10} = \frac{8}{5}$

5)

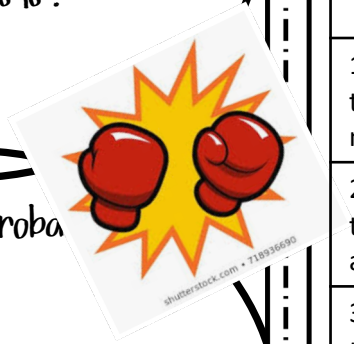


<1 = 45
<2 = ?

Learn

Theoretical Probability is:

An example is: If tossing a coin, the probability of it landing on heads is :



Experimental Proba

An example is: A coin is tossed 100 times. Heads appeared 60 times. Therefore, the probability of the coin landing on heads on the next toss is:

Roll a die 25 times and record the results in the frequency table below.

Result	1	2	3	4	5	6
Frequency						

Theoretical vs. Experimental

	Theoretical Probability	Experimental Probability
1) What is the probability that the next roll is an odd number?		
2) What is the probability that the next roll is a 1 or a 4?		
3) What is the probability that the next roll is at least 2?		
4) Out of 100 rolls, about how many times would you expect to roll a 3?		

Looking at your results above, do the theoretical match the experimental results?

How could the experimental results get closer to the theoretical results?

Practice

Amanda used a standard deck of 52 cards and selected a card at random. She recorded the suit of the card she picked, and then replaced the card. The results are in the table below.

Diamonds	𝍸 ||
Hearts	𝍸 |||
Spades	𝍸 𝍸 |
Clubs	|||

1. Based on her results, what is the experimental probability of selecting a heart?

2. What is the theoretical probability of selecting a heart?

3. Based on her results, what is the experimental probability of selecting a diamond or a spade?

4. What is the theoretical probability of selecting a diamond or a spade?

5. Compare these results, and describe your findings.

Standard: 7.SP.5
Tree Diagrams

Page # 68
Date:_____

Remember

1)66 is 120% of what number?

2) Are these figures similar?

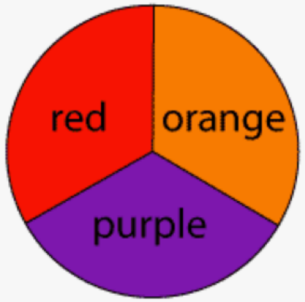
3) $-10^3 =$

4) Solve:
$x^2 = 121$

5) $\frac{2}{3} - \frac{3}{8} =$

Learn

Many times in probability there is more than one event, which results in several outcomes. _____ are a useful tool in organizing and listing all _____.



The spinner on the left is spun two times. Draw a tree diagram and then list the sample space and the number of outcomes.

Practice

1) A family has two children. Draw a tree diagram to show the sample space of the children's genders. Then determine the probability of the family having two girls.

2) Natalie has 8 socks in a drawer. 5 of the socks are black. 3 of the socks are white. Natalie takes out a sock at random, writes down its color and puts it back into the drawer. Then Natalie takes out a second sock, at random, and writes down its color. What is the probability that two socks are the same color?

Standard: 7.SP.5
:Fundamental Counting Principle

Page #70
Date:_____

Remember

1) $\sqrt{\frac{16}{25}}$

2) $1\frac{2}{3} + 1\frac{3}{4} =$

3) Can these lengths make a triangle?

3, 6, 10

4) Classify this triangle by its sides and angles.

5) Which quadrant?
(-2, 5)

(-3, -8)

Learn

Another way you can find the total outcomes is by using the _____. If one activity can occur in _____ ways and another activity can occur in _____ ways, then both activities can occur in _____ ways. So, you _____.

EX: If a restaurant offers 3 different drinks, 5 different meals and 2 kinds of dessert. How many total different ways can a person order when ordering?

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Practice

1. Suppose most of your clothes are dirty and you are left with 2 pants and 3 shirts. How many choices do you have or how many different ways can you dress?

2. You go to a restaurant to get some breakfast. The menu for food says pancakes, waffles, or home fries. For drinks the menu says: coffee, juice, hot chocolate, and tea. How many different choices of food and drink do you have?

3. You are buying a new car.

There are **2** body styles:

sedan or hatchback

There are **5** colors available:

There are **3** models:

GL (standard model),
SS (sports model with bigger engine)
SL (luxury model with leather seats)

How many total choices?

Standard: 7.SP.8a
Compound Events

Page # 72
Date: _____

Remember

1)Write $\frac{19}{40}$ as a decimal. No calculator.

2) What is 110% of 110?

3) What does z equal?

4) $18 \div 2(9) \times 12 =$

5) $1\frac{2}{5} \times 2\frac{2}{7} =$

What is a compound event?

Learn

P (compound event) = P (1st event) x P (2nd event) x P (3rd event)

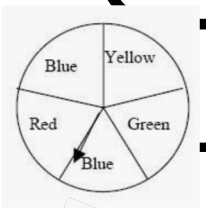
Dependent Events

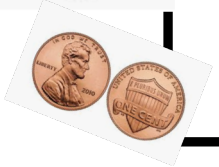
Events where one event _____ affect the likelihood/probability of the other events. (Without replacement -_____ _____)

There were 24 students in math class today. What is the probability that Mrs. Barnes randomly chooses Charlie to run to the office and randomly chooses Sophie to go with him?

Independent Events

Events where one event _____ affect the likelihood/probability of the other events. (With replacement- _____ _____)





You spin the spinner and then flip the coin. Find the probability of spinning a red or blue and getting tails.

Practice

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1) You flip two quarters. What is the probability that you flip two heads?

2) You randomly choose a flower from a vase, which has 4 yellow tulips and 2 purple irises to take home (so you do not replace it). Your friend randomly chooses another flower from the vase to take home. What is the probability that you choose a purple flower and your friend chooses a yellow flower?

3) You randomly choose a pair of sunglasses from the shelf below. Then you randomly choose a second pair of sunglasses without replacing the first pair. List all the possible outcomes of choosing a white pair and then a blue pair.

Standard: 7.SP.8c
Designing Simulations

Page # 74
Date: _____

Remember

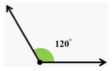
1) <x = ?
<y = ?
Why?

2) x = 3
$2x^2 + 7 = ?$

3) $-\frac{21}{32} \times \frac{2}{5}$

4) $t + 3.7 = -11.2$

5) What type of angle?



What is a simulation?

EXAMPLE: PRIZES

Learn

Simulations use models to act out an event that would be hard to perform or impractical.

Objects that can be used are:

Practice

A cereal company marks 1/6 of its box lids with stars. If a customer gets a star, he or she wins a prize. Design a simulation for estimating the probability that a customer will need to buy at least 3 boxes to win a prize.

a) What common item from your choices could you use as a simulator? _____

Why would this be a "good choice" to use for this simulation? (Hint: Think about the possible outcomes this simulator has)

Standard: 7.SP.1
Biased and Unbiased Samples

Page # 76
Date:_____

Remember

1) $\frac{9}{16} \times \frac{6}{13} \times \frac{8}{24} =$

2) 5 is what % of 22?

3) Draw a pair of perpendicular lines.

4) .25 ×.6 (no Calc)

5) x = -3
- x = ?

Learn

Population:

Sample:

Unbiased Sample

Biased Sample:

Practice

Determine whether each sample is biased or unbiased. Explain your thinking.

1) Mary interviewed the members of her lacrosse team to ask them what their favorite sport is.

2) The school board interviewed students in the band program to see if more money should be put into athletic programs or music programs at school?

3) A travel agent asks every other person who enters the mall what their favorite vacation destination is?

Standard: 7.SP.4
Measures of Central Tendency

Page # 78
Date:_____

Remember

1) $\frac{n}{6} = -18$

2) $\frac{9}{10} - \frac{1}{2} =$

3) True or False?

All vertical angles are $\cong$.

4) 18 is 150% of what?

5) $y + \frac{1}{4} = \frac{3}{4}$

Learn

MEASURES OF CENTRAL TENDENCY, which describe _____

- ✓ MEAN:
- ✓ MEDIAN:
- ✓ MODE(S):

RANGE:

The weight of each person on a football team:
180, 225, 175, 150, 180, 155, 165

Mean:

Median:

Mode(s):

Range:

OUTLIER:

Choosing the best center. Which one is most useful?

Mean –

Median –

Mode -

Practice

Determine which measure of center best represents the data. Explain your thinking, and then find the measure of center.

1) The golf scores in a tournament: (68, 72, 72, 72, 70, 72, 76, 72, 72, 72, 80, 72, 72, 72, 76, 72)

- ❑ Mean
- ❑ Median
- ❑ Mode

2) Number of hours that Charlie worked each week at his summer job: (38, 30, 35, 32, 28, 9, 25, 40, 32, 34, 29, 36)

- ❑ Mean
- ❑ Median
- ❑ Mode

3) The ball speed, in miles per hour, of a pitcher's last 8 pitches: (90, 85, 92, 95, 82, 92, 89, 87)

- ❑ Mean
- ❑ Median
- ❑ Mode

Standard: 7.SP.4
Mean Absolute Deviation

Page # 80
Date:_____

Remember

1)% of change?

Before = 15
After = 12

2) $\frac{3}{2} \div \frac{1}{3} =$

3) Find x.

4) Classify the triangle by its sides and angles.

5) $\frac{3}{8} + \frac{9}{10} =$

Definition:

The Mean Absolute Deviation (MAD) of a set of data is

_____

_____

_____

Learn

Definition:

Variability is

_____

_____

_____

The larger the MAD,

- _____

_____

_____

_____

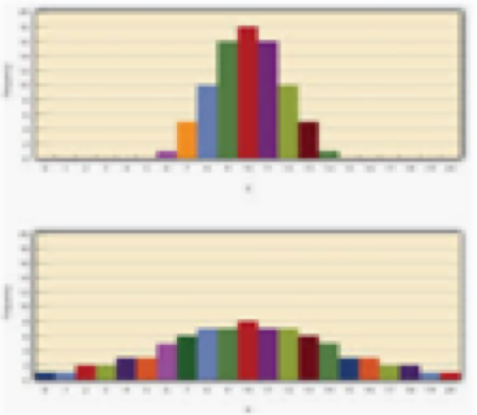
- _____

_____

_____

_____

Compare the graphs by discussing their variability:



Learn More

Let's compare Sam's data set with that belonging to Bill's to see what the Mean Absolute Deviation (MAD) tells us.

Steps to find the MAD	Sam's Data Set: (94, 85, 86, 93, 5, 88, 91)	Bill's Data Set: (92, 83, 88, 94, 91, 85, 89)
1) Find the mean		
2) Find the distance between each data value and the mean. (Remember distance will be positive because you are finding distances or absolute values)		
3) Find the average (mean) of these absolute values.		
4) Make a conclusion		

Standard: 7.SP.3
Stem and Leaf Plots

Page # 82
Date:_____

Remember

1)Can these side lengths make a triangle?
10, 20, 12

2) Write as a %:
$\frac{24}{32}$

3) Angles 7 and 8 are what type of angles?

4) Is this polygon regular? Why or why not?

5) $\frac{7}{8}$ as a decimal? No calc.

A stem-and-leaf plot is a way of _____ data using the digits of the data.

Learn

Step 1:Pick your "stems" and "leaves." You want the leaf to be one digit.

Step 2: Draw a vertical bar with all of the stems on the left.

0
1
2
3
4
5
6
7

Step 3: Put each leaf next to its stem, in order.

0	4 6
1	
2	
3	
4	
5	
6	
7	

Stemplot of Data Set

0	4 6
1	2 4 8
2	
3	3 4 4 5 5 7 8
4	2 2 5
5	0 1 8
6	8
7	2

Key: 1|0 = 10

Practice

Heights of Ceilings (cm)	
Stem	**Leaf**
24	1
25	0 3 3 3
26	2 2 8
27	1 7
Key: 24 | 1 = 241 cm	

List the data from least to greatest.

1) Find the mean. _____

2) Find the median. _____

3) Find the mode. _____

4) Find the range. _____

5) Why are some ceilings taller than others?

_____

Make a stem and leaf plot!

31, 48, 29, 34, 94, 36, 41, 45, 27, 49, 56, 49, 36, 52, 48, 96, 50, 54, 30, 29

Stem	Leaf

Key: 2\|7 = _____

Standard: 7.SP.3
Histograms

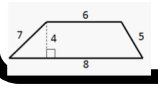
Page # 84
Date:_____

Remember

1)What is 60% of 120?

2) Write as a fraction:
95%
Did you simplify??

3) Find the area. Units are ft.



4) Is this a unique triangle?
<A = 80°
<B = 20°
<C = 80°

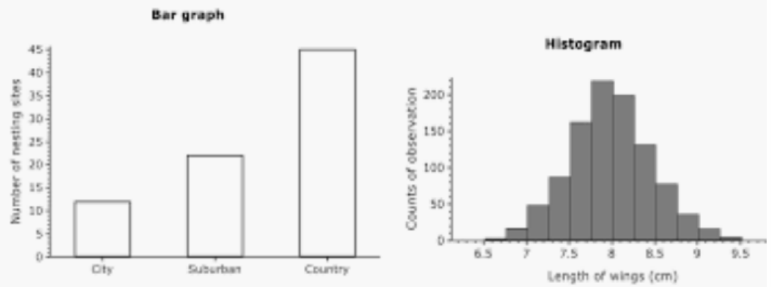
5) $>, <, or =$
$\frac{3}{50}$ ____ .6%

Learn

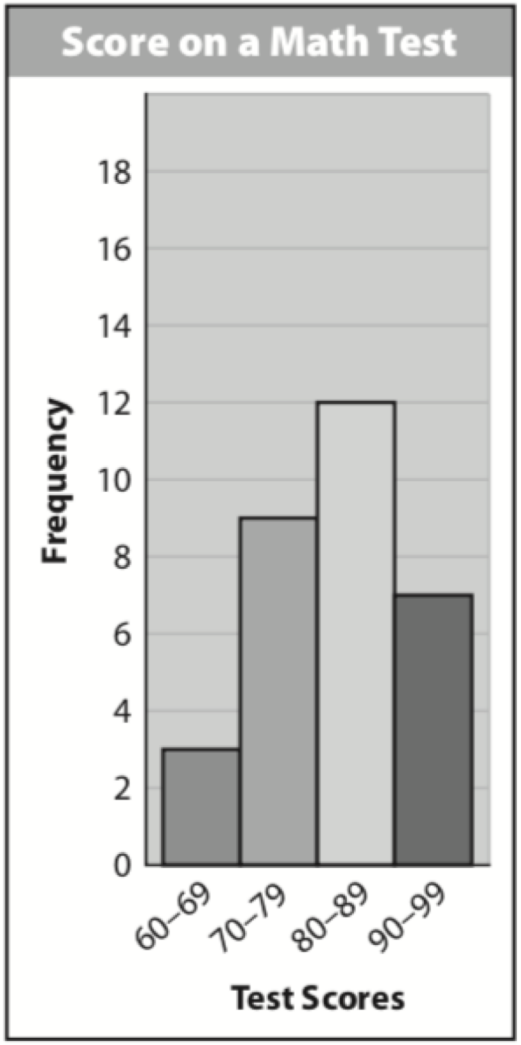
A Histogram is a type of graph that shows data using _____ of different _____. You might think it is like a bar graph, but there are some differences.

1. No Gaps: In a histogram there are no _____ between the bars

2. Numbers are grouped into _____. You decide what _____ to use.



Practice



A) Look at the histogram on the left. Which axis indicates the frequency?

B) What does the horizontal axis indicate?

C) How is the horizontal axis organized?

D) How many had scores in the interval 60-69?

E) Which interval contained the fewest scores?

F) What was the highest score?

Standard: 7.SP.3

Box and Whisker Plot

Page # 86

Date:_____

Remember

1)What is the area?

2) y = -2

$3y - y^2 =$

3) $< or >$

$|-2|$ ___ -3

4) What is the % of change?
Regular price= $31.99
Sale price = $23.39

5) Name the opposite and then the absolute value:
-56

A BOX AND WHISKER PLOT SHOWS THE _____ OF A DATA SET ALONG A _____.

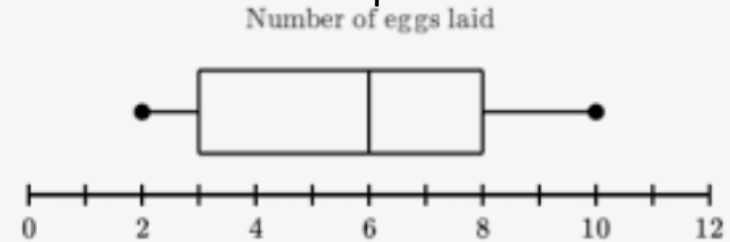
Learn

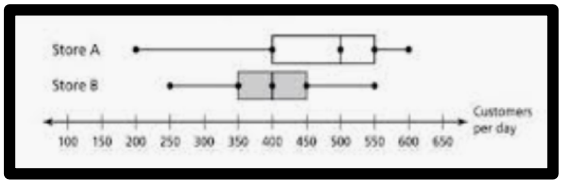
FIVE NUMBER SUMMARY

- MINIMUM VALUE:
- LOWER QUARTILE:
- MEDIAN:
- UPPER QUARTILE:
- MAXIMUM VALUE:

WHAT IS THE INTERQUARTILE RANGE?

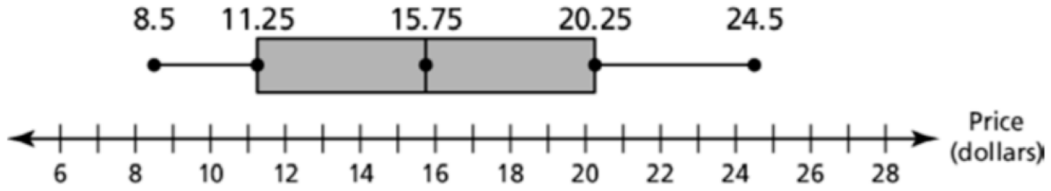
Label the five parts here:





Practice

The box-and-whisker plot represents the prices (in dollars) of soccer balls at different sporting goods stores.



Give the five number summary:

Minimum:

Lower Quartile:

Median:

Upper Quartile:

Maximum:

1) What is the range?

2) What is the interquartile range?

3) What percent of the balls are between $8.50 and $11.25?

4) What percent of the balls are at most $20.25?

5) Does the data vary more above or below the median?

More Practice

Make a box-and-whisker plot for the data.

Hours of TV watched: 0, 3, 4, 5, 3, 4, 6, 5